Safwan Wshah, University of Vermont

Associate Professor
Department of Computer Science
Vermont Complex Systems Center

417 Innovation
Office: **+1-(802) 656-8086**
E-mail:
safwan.wshah@uvm.edu

Summary

- Associate Professor of Computer Science at the University of Vermont (UVM) and Director of the Vermont Artificial Intelligence Lab (VaiL), specializing in geospatial AI, cross-view geo-localization, and multimodal deep learning.
- Extensive experience collaborating with domain experts across transportation, energy, communication, environmental science, healthcare, and medicine to integrate advanced machine learning models into real-world analytical and decision-making pipelines.
- Extensive research experience in developing AI systems that fuse ground, aerial, and satellite imagery for environmental monitoring, transportation safety, and climate resilience—areas.
- Fulbright Global Scholar (2023), conducting research in the Middle East on AI-driven algorithms using satellite imagery for environmental monitoring.
- Proven track record of securing competitive funding (over $1.28M as PI and $2.135M as co-PI/key personnel), with contributions to projects totaling over $16M from NSF, NASA, NIH, NOAA, CRREL, and state agencies.
- Published 25+ journal articles, 50+ conference papers, and 20+ patents across machine learning, computer vision, medical AI, power systems, transportation, communication, and environmental modeling.
- Leader and mentor to a large, active research group: graduated 4 PhD and 5 MS students and currently supervising 7 PhD and 2 MS students.
- Experienced educator teaching Machine Learning and Deep Learning with strong course evaluations and a proven ability to build project-based, industry-relevant AI curricula.
- Committed to interdisciplinary collaboration, knowledge transfer, and building AI capacity on a global scale.

Research Interests

My research lies at the intersection of machine learning, foundational theory, and real-world application. I work closely with domain experts across transportation engineering, energy systems, environmental science, public health, and medicine to integrate advanced AI methods into their workflows. While my core focus is in computer vision and geospatial intelligence, I develop multimodal learning systems capable of understanding, localizing, and modeling the physical world using data from ground cameras, aerial platforms, satellites, and ground sensors.

Key areas of interest include:

- **Cross-view and satellite-based geo-localization**, including generative models and multimodal representation learning.
- **AI for environmental and climate resilience**, including alge-bloom prediction and wetland detection.
- **Synthetic data generation and diffusion models** for geospatial scenes, medical imagery, and remote sensing.
- **Multimodal learning** that integrates imagery, text, weather data, and IoT sensor streams.
- **Explainable and adaptable AI** for high-stakes domains: medicine, energy systems, and critical infrastructure.

My future interests aims to build robust, scalable AI models that generalize across diverse environments and support decision-making for sustainability, climate adaptation, and public safety.

Education

University at Buffalo, Buffalo, NY USA
PhD, Department of Computer Science and Engineering, May 2008 to June 2012.

The University of Jordan, Amman, Jordan
MSc. in Communication engineering, Department of Electrical Engineering, Sep 2002 to Jul 2005.

Princess Sumaya University, Amman, Jordan
BSc. in Electronics engineering, Department of Electronics Engineering, Oct. 1996 to Feb. 2001.

Academic Experience

University of Vermont, Burlington, VT, USA
Assistant Professor (2017 - 2023), Associate Professor (2023 - Present), Director of Vermont Artificial Intelligence Lab VaiL

At the Vermont Artificial Intelligence Laboratory (VaiL) we work at the intersection of machine learning theory and application. Our mission is to improve the adaptability and generalization of machine learning methods, in order to allow higher-quality applications to broader classes of real-life problems. Our core area is geospatial understanding using ground-based, aerial, and satellite imagery, with a specialization in visual geo-localization. We also collaborate with groups from other fields, such as Medical, Transportation, Energy, and Communication.
For a complete list of recent projects refer to: http://www.wshahaigroup.com/

Princess Sumaya University for Technology, Amman, Jordan **September 2023 to May 2024**
Fulbright Global Scholar, Visiting Professor

Selected Grants Awarded

ARGUS: Arbitrary Object Re-identification and Geolocalization from Unknown Sensors
Role: co-PI
Amount: $15,240,978 (Pending).
Duration: 2025-2029
Funding source: IARPA.

III: Medium: Toward Robust and Private Cross-view Geo-localization
Role: PI
Amount: $1,200,000 (Pending).
Duration: 2026-2030
Funding source: NSF.

Testing Artificial Intelligence Augmented Drought Early Warning Early Action Systems (AI-DEWS) for Building Climate Resilient Communities
Role: co-PI
Amount: $852,431 (Pending).
Duration: 2026-2029
Funding source: NASA.

Precision Design of Antimicrobial Peptides Against Bacterial Infections
Role: Co-investigator
Amount: $1.9 M Total, $516,040 to my lab **(awarded)**.
Duration: 2022-2027
Funding source: NIH - R01, National Institute of General Medical Sciences (NIGMS).

Objects geo-localization from ground and satellite images
Role: Solo PI
Amount: $580K **(awarded)** all toward my lab
Duration: 2018-2024.
Funding source: Vermont Agency of Transportation, VT

RII Track-2 FEC: Advancing Research Towards Industries of the Future to Ensure Economic Growth for EPSCoR Jurisdictions - Advanced Wireless - Integration with Infrastructure Systems and IoT
Role: CO-PI, Effectively participated in grant writing and managing the Artificial Intelligence part of the proposal.
Amount: $3.99M Total, $431,441 to my lab **(awarded)**
Duration: 2021-2025
Funding source: NSF

RII Track-2 FEC: Explainable and Adaptable Artificial Intelligence for Advanced Manufacturing
Role: Key-personnel
Amount: $1.02M Total, $323,581 to my lab **(awarded)**
Duration: 2022-2026
Funding source: NSF

Cold Weather Summit-to-Shore Environmental Observation Network
Role: Key-personnel, Participated in grant writing.
Amount: $4M Total, $504,526 to my lab **(awarded)**
Duration: 2022-2025
Funding source: Cold Regions Research and Engineering Laboratory (CRREL)

CIROH: Forecasting the Incidence and Duration of Harmful Algal Blooms (HABs) at Daily, Weekly and Seasonal Scales
Role: Key-personnel
Amount: $4M Total, $361,299 to my lab **(awarded)**
Duration: 2022-2025
Funding source: NOAA's National Water Center.

Machine Learning Algorithm for Power Systems Parameters Verification
Role: PI
Amount: $90,000 **(awarded)**
Duration: 2019-2020
Funding source: The New York State Energy Research and Development Authority (NYSERDA)

MRI: Acquisition of a GPU Accelerated Vermont Advanced Computing Core.
Role: CO-PI
Amount: $893,120 **(awarded)** toward VACC computational infrastructure.
Duration: 2018-2021
Funding source: NSF

Research Experience

PARC - A Xerox Company, Webster, NY, USA **June 2014 to August 2017**
Research Scientist

Creating novel machine learning and image processing algorithms in computer vision and

document imaging fields for transportation, healthcare, and education. I implemented algorithms for object detection, tracking, image classification, and domain adaptation. Trained and tested deep learning models using Caffe, TensorFlo,w and MatConvNet under both Linux and Windows. Instructed the internal course "Deep Learning in Computer Vision". **Selected Projects:**

- **Human Video Analytics**: In this research, advanced algorithms for human activities recognition in surveillance cameras are presented, including detection, tracking, and action recognition.

- **Surgical Video Analytics**: This Project is a collaboration with the University of Rochester Medical Center (URMC) in which we were the first to apply advanced Deep learning methods for action quality assessment in clinical settings. We analyzed in-vivo videos captured during a surgical procedure to evaluate the quality of the procedure, identify errors, assess the surgeon's expertise and skill level, and provide coaching and feedback to surgical students for each action.

Xerox Research Center, Webster, NY, USA **August 2012 to May 2014**
Research Scientist

Creating new machine learning and image processing algorithms in document imaging fields for transportation, healthcare and education. I implemented image processing and machine learning, deep learning algorithms for handwriting recognition, form understanding, form registration, form data extraction, and word spotting.

Center for Unified Biometrics and Sensors, University at Buffalo, **Buffalo, NY USA, August 2008 - July 2012**
Research Scientist

During my PhD, I developed advanced machine learning algorithms for multilingual handwriting recognition, including a novel keyword-spotting framework using filler and background Markov models, as well as statistical and language-modeling techniques—such as n-gram models and continuous probability connected Hidden Markov Models—that enabled full Arabic handwriting recognition without the need for line segmentation.

Teaching Experience

Assistant and Associate Professor, University of Vermont, Computer Science Department (2017 until Present): I teach Machine Learning (CS 254) and Deep Learning (CS 354)courses. These courses are offered for both graduate and undergraduate students in both in-person and online modalities. Courses were developed from scratch. These are project-based courses in which each group of students implement machine learning algorithms from real-world data. The average number of students is 45 for the machine learning course and 20 for the Deep learning. My teaching evaluations are at or above the college teaching average.

Adjunct Professor, University of Rochester Department of Electrical and Computer Engineering (Fall 2016): I taught a Digital Signal Processing course as the primary instructor. The course had 45 students from graduate and undergraduate levels from the Electrical and Biomedical Engineering Departments.

Industry Course, PARC (Fall-2015): Teaching *Deep Learning in Computer Vision* for more than 50 engineers and researchers from different backgrounds. At that time, the deep learning field was new, and I designed the course based on my experience in the field, in addition to the quickly evolving science in this area at that time.

Doctoral Dissertation

Title: "Word Spotting in Multilingual Handwritten Documents."
Advisor: Prof. Venu Govindaraju, SUNY Distinguished Professor.

I introduced a new Machine learning approach for keywords spotting in multilingual handwritten documents based on statistical Markov models. The approach is script-independent, scalable over many languages such as English, Arabic, and Devanagari, and has many applications in information retrieval and indexing, including language identification of handwritten documents.

Mentoring

I've graduated four PhD students from my lab at University of Vermont. Currently, I am supervising 7 PhDs and two MS students in the Computer Science program. During my professional career as a researcher at PARC and Xerox research labs, I mentored four senior graduate students during their summer internships.

Industry Experience

Xerox, Webster, NY, USA
Software Engineer, Internship **May 2011 to Sep. 2011**

I created a framework to globally and locally register medical forms using advanced machine learning and pattern-matching algorithms.

Applied Media Analysis, Collge Park, MD, USA
Software Engineer, Internship **May 2010 to Sep. 2010**

Research and development of software for Arabic Optical Character Recognition using continuous probability-Connected Hidden Markov Models. The developed algorithm alleviated the need for segmenting Arabic text prior to recognition. The algorithm performed concurrently both segmentation and recognition.

Copanion, Andover, MA, USA
Software Engineer, Internship **May 2009 to Sep. 2009**

Development of advanced convolutional neural network algorithms to recognize English handwritten text used for tax form recognition.

Lead Technologies
Software Engineer **Jan. 2001 to Sep. 2007**
Development and Research at different levels:

- Research in Image, Document, and Video processing algorithms.
- Implementing the developed algorithms under C, C++, Java, and .Net.
- Involved in training and guiding new members and updating work guidelines.
- Team leader (9 Team members), managing and supervising all team projects.

Journal articles

M. Adil, P. J. Clemins, A. W. Schroth, P. D. Oikonomou, D. M. Rizzo, P. D. F. Isles, X. Zhang, K. I. Hannoun, S. Turnbull, N. B. Beckage, A. Zia, **S. Wshah**, "From Remote Sensing to Multiple Time Horizons Forecasts: Transformers Model for CyanoHAB Intensity in Lake Champlain," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, resubmitted,**Impact factor: 5.3**, 2025.

D. Wilson, M. Adil, A. Zia, **S. Wshah**, "Synthetic Geospatial Scene Rendering from Satellite Imagery and Weather Data," *Journal of Photogrammetry and Remote Sensing*, submitted, 2025.

D. Wilson, A. Adil, A. Zia, **S. Wshah**, "Multi-Scale Wetland Segmentation: Integrating Local and Regional Contexts from Aerial Imagery," *Journal of Photogrammetry and Remote Sensing*, submitted, 2025.

A. A. Lehyeh, A. Gharib, T. Xia, D. Huston, **S. Wshah**, "UBiGTLoc: A Unified BiLSTM–Graph Transformer Localization Framework for IoT Sensor Networks," *IEEE Internet of Things Journal*, **Impact factor: 8.9**, 2025.

X. Zhang, X. Li, W. Sultani, C. Chen, **S. Wshah**, "GeoDTR+: Toward Generic Cross-View Geolocalization via Geometric Disentanglement," *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2024. **Impact factor: 20.8**.

D. Wilson, X. Zhang, W. Sultani, **S. Wshah**, "Image and Object Geo-Localization," *International Journal of Computer Vision (IJCV)*, 2023. **Impact factor: 19.5**.

M. Matar, S. Brahma, H. Mavalizadeh, M. Almassalkhi, **S. Wshah**, "State-of-Charge Estimation of Virtual Batteries using Deep Learning Techniques," *Journal of Energy Storage*, October 2022. **Impact factor: 8.9**.

C. Van Oort, B. Tivnan, **S. Wshah**, "Adaptive Agents and Data Quality in Agent-Based Financial Markets," *ACM Collective Intelligence*, under review, 2024.

N. Ogilvie, X. Zhang, C. Kochenour, **S. Wshah**, "Fine-Grained Permeable Surface Mapping through Parallel U-Net," *Sensors*, 2024. **Impact factor: 4.05**.

M. Matar, T. Xia, K. Huguenard, D. Huston, **S. Wshah**, "Anomaly Detection in Coastal Wireless Sensors via Efficient Deep Sequential Learning," *IEEE Access*, 2023. **Impact factor: 4.05**.

F. Almutairy, L. Scekic, R. Elmoudi, **S. Wshah**, "Detection and Mitigation of GPS Spoofing Attacks against Phasor Measurement Units using Deep Learning," *International Journal of Electrical Power & Energy Systems*, 2022. **Impact factor: 5.0**.

M. Matar, B. Xu, R. Elmoudi, O. Olatujoye, **S. Wshah**, "Deep Learning-Based Framework for Parameters Calibration of Power Generator Models using Event Playback Approach," *IEEE Access*, 2022. **Impact factor: 4.34**.

D. Wilson, T. Alshaabi, C. Van Oort, X. Zhang, J. Nelson, **S. Wshah**, "Object Tracking and Geo-localization from Street Images," *Remote Sensing*, 2022. **Impact factor: 4.8**.

S. Wshah, B. Xu, J. Steinharter, C. Reilly, K. Morrissette, "Classification of Clinically Relevant Intravascular Volume Status using Point-of-Care Ultrasound and Machine Learning," *Journal of Medical Imaging*, 2022. **Impact factor: 3.6**.

F. Almutairy, L. Scekic, R. Elmoudi, **S. Wshah**, "Accurate Detection of False Data Injection Attacks in Renewable Power Systems using Deep Learning," *IEEE Access*, 2021. **Impact factor: 3.367**.

C. Van Oort, J. Ferrell, J. Remington, **S. Wshah**, J. Li, "AMPGAN v2: Machine Learning–Guided Design of Antimicrobial Peptides," *Journal of Chemical Information and Modeling*, 2021. **Impact factor: 4.956**.

K. McClure, B. Erdreich, J. H. T. Bates, R. McGinnis, A. Masquelin, **S. Wshah**, "Classification and Detection of Breathing Patterns with Wearable Sensors and Deep Learning," *Sensors Journal*, submitted, 2020. **Impact factor: 3.275**.

J. Ferrell, J. Remington, C. Van Oort, M. Sharafi, R. Aboushousha, Y. Janssen-Heininger, S. Schneebeli, M. Wargo, **S. Wshah**, J. Li, "A Generative Approach toward Precision Antimicrobial Peptide Design," *bioRxiv*, 2020.

L. Bonnell, B. Littenberg, **S. Wshah**, G. Rose, "Automated Identification of Unhealthy Drinking: A Machine Learning Approach," *Journal of the American Board of Family Medicine*, 2020. **Impact factor: ∼2.7**.

F. Almutairy, T. Alshaabi, J. Nelson, **S. Wshah**, "ARTS: Automotive Repository of Traffic Signs for the United States," *IEEE Transactions on Intelligent Transportation Systems*, 2019. **Impact factor: 6.31**.

S. Hahn, M. Perry, **S. Wshah**, C. S. Morris, D. J. Bertges, "Machine Deep Learning Accurately Detects Endoleak After Endovascular Abdominal Aortic Aneurysm Repair," *Journal of Vascular Surgery*, 2019. **Impact factor: 3.7**.

S. Wshah, C. Skalka, M. Price, "Machine Learning Methods for Post-Traumatic Stress Disorder Patient Prediction," *JMIR*, 2019. **Impact factor: ∼5**.

S. Wshah, G. Kumar, V. Govindaraju, "Statistical Script-Independent Word Spotting in Offline Handwritten Documents," *Pattern Recognition*, 2014.

S. Wshah, I. Mansour, "A Robust Algorithm for Face Detection in Color Images Based on Color Segmentation and Neural Network Techniques," *Dirasat: Engineering Sciences*, 2006.

Peer-Reviewed Conference Publications

Y. Zhang, X. Zhang, G. Sun, Z. Lyu, **S. Wshah**, C. Chen, "*GeoG*: Geometry-Guided Cross-view Geo-Localization and Image Synthesis," *CVPR*, submitted, 2026.

A. A. Lehyeh, X. Zhang, A. Arrabi, W. Sultani, C. Chen, **S. Wshah**, "GeoFlow: Real-Time Fine-Grained Cross-View Geolocalization via Iterative Flow Prediction," *CVPR*, submitted, 2026.

A. Arrabi, X. Zhang, X. Li, **S. Wshah**, "Split and Bridge: Joint Multi-Representation Generation via Diffusion Bridging," *CVPR*, submitted, 2026.

Y. Chen, X. Zhang, A. Arrabi, W. Sultani, C. Chen, **S. Wshah**, "Turning Generators into Retrievers: Unlocking MLLMs for Natural Language-Guided Geo-Localization," *CVPR*, submitted, 2026.

A. Arrabi, X. Zhang, W. Sultani, C. Chen, **S. Wshah**, "Cross-View Meets Diffusion: Aerial Image Synthesis with Geometry and Text Guidance," *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2025.

A. Arrabi, J. Jung, J. Le, A. Nguyen, J. Reed, E. Stahl, N. Franssen, S. Raymond, **S. Wshah**, "C-ARM Guidance: A Self-Supervised Approach to Automated Positioning During Stroke Thrombectomy," *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2025.

X. Zhang, T. Shore, C. Chen, O. Mendez, S. Hadfield, **S. Wshah**, "VICI: VLM-Instructed Cross-View Image-Localisation," *arXiv*, 2025.

A. Kashkoush, A. Arrabi, J. Jung, N. Franssen, **S. Wshah**, S. E. Raymond, "Deep Learning Model Predicts Biplane Trajectory from Pelvis to the Head," *BMJ*, 2025.

M. Adil, P. D. Oikonomou, D. M. Rizzo, P. J. Clemins, A. W. Schroth, P. D. F. Isles, **S. Wshah**, A. Zia, "AI Framework to Model Chlorophyll Concentration Using Sentinel-2 Data in Inland Waters Across CONUS," *AGU Fall Meeting*, 2024.

M. Adil, P. D. Oikonomou, P. J. Clemins, **S. Wshah**, A. Zia, "GeoS2Py: Simplifying Advanced Sentinel-2 Data Access," *AGU Fall Meeting*, 2024.

A. Arif, S. S. Sheikh, M. H. Ali, D. Arif, **S. Wshah**, "Data-Driven Capacity Degradation Modeling for Commercial Lithium-Iron Phosphatase Batteries under Fast-Charging Conditions using LSTM," *International Conference on Emerging Power Technologies (ICEPT)*, 2025.

X. Zhang, X. Li, W. Sultani, **S. Wshah**, "Cross-View Geo-Localization via Learning Disentangled Geometric Layout Correspondence," *AAAI Conference on Artificial Intelligence (AAAI)*, 2023.

X. Zhang, W. Sultani, **S. Wshah**, "Cross-View Image Sequence Geo-Localization," *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2023.

X. Zhang, **S. Wshah**, "LanePainter: Lane Marks Enhancement via Generative Adversarial Network," *International Conference on Pattern Recognition (ICPR)*, 2022.

M. Matar, T. Xia, K. Huguenard, D. Huston, **S. Wshah**, "Multi-Head Attention-Based Bi-LSTM for Anomaly Detection in Multivariate Time-Series of WSN," *IEEE International Conference on Artificial Intelligence Circuits and Systems (AICAS)*, 2023.

S. Wshah, B. Xu, J. Bates, K. Morrissette, "Deep Fusion of Ultrasound Videos for Furosemide Classification," *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2022.

F. Almutairy, R. Shadid, **S. Wshah**, "Identification and Correction of False Data Injection Attacks against AC State Estimation using Deep Learning," *IEEE Power & Energy Society General Meeting*, accepted, 2020.

S. Wshah, R. Shadid, Y. Wu, M. Matar, B. Xu, W. Wu, L. Lin, R. Elmoudi, "Deep Learning for Model Parameter Calibration in Power Systems," *IEEE International Conference on Power System Technology (POWERCON)*, 2020.

W. Wu, L. Lin, **S. Wshah**, R. Elmoudi, B. Xu, "Generator Model Parameter Calibration Using Reinforcement Learning," *IEEE Green Energy and Smart Systems Conference (IGESSC)*, 2020.

L. Lin, W. Wu, **S. Wshah**, R. Elmoudi, B. Xu, "HPT-RL: Calibrating Power System Models Based on Hierarchical Parameter Tuning and Reinforcement Learning," *IEEE International Conference on Machine Learning and Applications (ICMLA)*, 2020.

A. Elhadad, T. Sullivan, **S. Wshah**, T. Xia, "Machine Learning for Respiratory Detection via UWB Radar Sensor," *IEEE International Symposium on Circuits and Systems (ISCAS)*, 2020.

S. Hahn, C. Morris, D. Bertges, **S. Wshah**, "Deep Learning for Recognition of Endoleak after Endovascular Abdominal Aortic Aneurysm Repair," submitted to *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2019.

S. Hamshaw, D. Denu, M. Holthuijzen, **S. Wshah**, D. Rizzo, "Automating the Classification of Hysteresis in Event Concentration–Discharge Relationships," *SEDHYD Conference*, 2019.

S. Wshah, B. Xu, O. Bulan, J. Kumar, P. Paul, "Deep Learning Architectures for Domain Adaptation in HOV/HOT Lane Enforcement," *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 2016.

B. Xu, O. Bulan, J. Kumar, **S. Wshah**, V. Kozitsky, P. Paul, "Comparison of Early and Late Information Fusion for Multi-Camera HOV Lane Enforcement," *IEEE International Conference on Intelligent Transportation Systems (ITSC)*, 2015.

E. Gross, **S. Wshah**, I. Simmons, G. Skinner, "A Handwriting Recognition System for the Classroom," *International Conference on Learning Analytics and Knowledge (LAK)*, 2015.

O. Bulan, **S. Wshah**, R. Palghat, V. Kozitsky, A. Burry, "USDOT Number Localization and Recognition from Vehicle Side-View NIR Images," *IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops)*, 2015.

G. Kumar, **S. Wshah**, V. Govindaraju, "Variational Dynamic Background Model for Keyword Spotting in Handwritten Documents," *IS&T/SPIE Electronic Imaging*, 2013.

G. Kumar, **S. Wshah**, V. Govindaraju, "Segmentation-Free Keyword Spotting Framework Using Dynamic Background Model," *Document Recognition and Retrieval XX (DRR)*, 2013.

S. Wshah, G. Kumar, V. Govindaraju, "Multilingual Word Spotting in Offline Handwritten Documents," *21st International Conference on Pattern Recognition (ICPR)*, 2012.

S. Wshah, G. Kumar, V. Govindaraju, "Script-Independent Word Spotting in Offline Handwritten Documents Based on Hidden Markov Models," *International Conference on Frontiers in Handwriting Recognition (ICFHR)*, 2012.

S. Wshah, Y. Chen, L. Huiping, V. Govindaraju, "A Novel Lexicon Reduction Method for Arabic Handwriting Recognition," *International Conference on Pattern Recognition (ICPR)*, 2010.

S. Wshah, Z. Shi, V. Govindaraju, "Segmentation of Arabic Handwriting Based on Both Contour and Skeleton Segmentation," *International Conference on Document Analysis and Recognition (ICDAR)*, 2009.

S. Wshah, I. Mansour, "A Robust Algorithm for Face Detection in Color Images," *IASTED International Conference on Visualization, Imaging, and Image Processing (VIIP)*, 2005.

Patents

S. Hahn, C. Morris, D. Bertges, **S. Wshah**, "Method and apparatus for detecting endoleaks on computerized tomography scans after endovascular aortic aneurysm repair," Patent No. V0139.70127US00, 2019. (In review)

S. Wshah, B. Xu, O. Bulan, "System and method for expanding and training convolutional neural networks for large size input images," US Patent App. 15/194,757, 2019.

R. Eschbach, P. J. Emmett, **S. Wshah**, E. N. Chapman, "Methods and systems of creating a confidence map for fillable forms," US Patent App. 14/816,142, 2018.

S. Wshah, R. Bala, D. Arpit, "Method and system for evaluating the quality of a surgical procedure from in-vivo video," US Patent App. 15/138,494, 2017.

S. Wshah, B. Xu, O. Bulan, "Multi-layer fusion in a convolutional neural network for image classification," US Patent App. 15/179,403, 2017.

B. L. Balamurugan, M. Stone, M. Samptha, R. Taylor, **S. Wshah**, "Cost-optimized crowdsourcing-based enterprise form digitization," Patent 20150052, March 2015.

M. Maltz, **S. Wshah**, "Building tables with row and column headings from a scanned form," Patent 20150435, July 2015.

S. Wshah, M. Maltz, D. Venable, "Identifying fillable fields of an electronic form," Patent 20151112US01, December 2015.

S. Wshah, M. Campanelli, "Character recognition using digit segmentation and recombination," US Patent App. 15/149,483, 2013.

S. Wshah, M. Campanelli, "Global registration of filled-out content in an application form," US Patent App. 15/149,483, 2013.

S. Wshah, M. Campanelli, Y. Zhou, "Classifying machine-printed and handwritten text," US Patent App. 14/284,592, 2014.

S. Wshah, M. Campanelli, "Form-independent registration of filled-out content," US Patent App. 14/196,108, 2014.

R. Eschbach, **S. Wshah**, "Altering scans to include security features identifying scan origination," US Patent 9,258,452, 2014.

E. Gross, G. Skinner, **S. Wshah**, I. Simmons, "Confirming automatically recognized handwritten answers," US Patent App. 14/627,457, 2014.

Honors & Awards

- Fulbright Scholar Award, 2023.
- Excellence in Research Award, College of Engineering and Mathematical Sciences (CEMS), UVM, 2023.
- PARC Special Award for Contributions to the Most Innovative Project, 2015.
- Graduate Teaching Assistantship, University at Buffalo, 2010–2012.
- Graduate Research Assistantship, University at Buffalo, 2008–2010.
- Graduate Research Assistantship, University of Cincinnati, Jan–May 2008.
- Graduate Teaching Assistantship, University of Cincinnati, 2007–2008.

Invited Talks

"**Cross-View Geo-Localization and Geospatial AI (CVGL Tutorial)**", Invited Speaker, IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), February 28, 2025.

"**Objects and Image Geo-localization from Visual Data**", Invited talk at the AI, Machine Learning and Data Science Meetup, 2024.

"**Third Wave of AI: From Narrow to General AI**", Keynote Speaker, IEEE Jordan Section 2024. https://www.youtube.com/watch?v=LKEitIbTJwE

"**Leveraging Machine Learning for Early Warning Systems with Satellite Imagery**", Fulbright Spain Mediterranean Research Seminar 2023, November, 2023.

Invited speaker to NASPI, **Deep learning for model parameters calibration in power systems**, 2021

"**Deep Learning in Radiology: Recent Advances, Challenges and Future Trends**", University of Pittsburgh, Medical school. 2020

"**Model Parameters Verification", Invited talk at UVM EBE**, Feb-2, 2019.

"**Machine learning challenges and opportunities in the Energy field**", NYSERDA, NY, Oct. 2019.

"**Opportunities and Challenges of Machine Learning in Real-World Applications**", Invited talk at PSUT University, January 2, 2018.

"**Opportunities and Challenges of Machine Learning in Real-World Applications**", Invited talk at UVM EBE University, Feb-2, 2018.

"**Deep Learning in Radiology: Recent Advances, Challenges and Future Trends**", Invited talk at UVMMC, Radiology department, September, 2018.

"**Deep Learning in Transportation Applications**", Invited talk at UVM CEE University, November, 2017.

Program Committee

Publicity Chair, The International Conference on Document Analysis and Recognition (ICDAR) 2023

Intelligent Systems Conference, 2022.

International Conference on Pattern Recognition (ICPR 2022, ICPR 2020, ICPR2019, ICPR 2018, ICPR2017)

ASIP-2021 Asia Symposium on Image Processing.

The 2017 International Conference on Advanced Technologies Enhancing Education (ICAT2E2017), 2017

The Seventh International Conference on Performance, Safety and Robustness in Complex Systems and Applications(PESARO 2017), 2017

ICDAR Conference on Document Analysis and Recognition, Nancy, France, 2015.

Program Chair, 5th International Workshop on Multilingual OCR, Nancy, France, 2015.

Reviewer for Journals and Conferences

NeurIPS, WACV, ICPR, CVPR, ECCV, ICCV.

Journal of Pattern recognition.

Nature Communications.

IEEE Transactions on Pattern Analysis and Machine Intelligence.

International journal of computer vision

International Journal of Pattern Recognition and Artificial Intelligence.

Signal Image and Video Processing journal.

Journal of smart science.

Patterns Journal.

IEEE Power & Energy society general meeting.

Energies- Open Access Journal by MDPI

IEEE PES General Meeting

Professional Service

Reviewer, **National Science Foundation (NSF)** — Panel reviewer for multiple programs, including AI, computer vision, and interdisciplinary research programs.

Reviewer, **National Institutes of Health (NIH)** — Study section reviewer for machine learning and AI-driven biomedical proposals.

Tutorials & Workshops Organized

"**Cross-View Geo-Localization and Geospatial AI (CVGL Tutorial)**", IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), February 28, 2025. Co-organizers: Chen Chen, Xiaohan Zhang, **Safwan Wshah**.

professional memberships

Member of IEEE (Institute of Electrical and Electronics Engineers) and Computing Machinery (ACM)

Technical Skills

Platforms: Windows, UNIX
Programming Languages and toolkits: Python, C, C++, Caffe, Torch, Matlab, OpenCV, .Net (C#, VB), Java, VB, SQL, Assembly, verilog.
Scripting Language: Shell Scripts, Perl.
Web Technologies : HTML, JavaScript, VBScript.
Tools : DirectX, Nvidia GPU processing.